

ENVIRONMENTAL MANAGEMENT AND FIRM PERFORMANCE: A PANEL VAR APPROACH

Tommy Lundgren, CERE, Umeå University, SLU, +46 90 7866910, tommy.lundgren@umu.se
Shanshan Zhang, CERE, SLU, +46 09 7867794, shanshan.zhang@slu.se
Wenchao Zhou, CERUM, Umeå University, +46 90 7865685, wenchao.zhou@umu.se

Overview

Environmental footprint has received increasing attention in the last decades. The main focus has been on climate impacts and greenhouse gases (GHGs) emission. In line with the increasing environmental concerns, firms have received large pressure from environmental regulations, in which they have to be compliance with. Whether environmental regulation can improve firms' competitiveness has been, and still remain a debate since the 1995 Porter hypothesis (Porter and van der Linde, 1995; Brännlund et al., 1995; Jaffe and Pamler, 1997; Gray and Shadbegian, 2003; Hamamoto, 2006; Brännlund and Lundgren, 2010). On the other hand, firms may go beyond compliance, take a proactive role in the environmental management (self-regulation), and thus implement corporate social responsibility (CSR) (McWilliams and Sigel, 2000; Paul and Siegel, 2006; Reinhardt et al., 2008; Lundgren, 2011; Kitzmueller and Shimshack, 2012).

The Swedish industry contributes to about 20% of GDP and is an important component of the country's economic growth (Nauclet et al., 2012). The industry uses almost 40% of Sweden's final energy consumption. Although the energy use is mainly biofuels and electricity, fossil fuel still constitutes about 22% in 2011, and is responsible for 80% of the GHGs emissions (Swedish Energy Agency, 2013). Due to the important role the industry has in economy and for the environment there is an increasing demand in society for responsible business practice. Whether it is driven by regulation or self-regulation (CSR), understanding the relationships between firm economic and environmental performance is crucial to be able to evaluate impacts of environmental investments and assess the role of environmental management.

This paper analyzes the interactions between three dimensions of firm performance – productivity, energy efficiency, and environmental performance – and sheds light on the role of environmental investment. Environmental investments are efforts to reduce environmental impact, which may also affect firm competitiveness, in terms of changes in productivity, and spur more (or less) efficient use of energy. We apply data envelopment analysis (DEA) technique to calculate the Malmquist firm performance indexes, and a panel vector auto-regression (VAR) methodology is utilized to investigate the dynamic and causal relationship between the three dimensions of firm performance and environmental investment. We carry out an empirical analysis using a firm-level, industry-wide panel data-set in Swedish industry for the period 2002 - 2008.

Methods

DEA-like linear programming of Malmquist indexes; panel VAR.

Main results and conclusions

Main results show that energy efficiency and environmental performance are integrated, and energy efficiency and productivity positively reinforce each other. Hence, increasing energy efficiency, as advocated in many of today's energy policies, would capture multiple benefits. However, improved environmental performance and environmental investment - induced by external or internal policy - constrains next period productivity, a result that would be in contrast with the so called Porter hypothesis and the notion of positive effects on productivity accruing from strategic corporate social responsibility (CSR). However, we also find that environmental investment, if channeled via improved energy efficiency, would in turn affect productivity positively, signifying the role of increased energy efficiency as a cost saving policy.

References

Brännlund, R., Färe, R., Grosskopf, S., 1995. Environmental Regulation and Profitability: An Application to Swedish Pulp and Paper Mills. *Environmental and Resource Economics* 6, 23-36.

- Brännlund, R., Lundgren, T., 2010. Environmental policy and profitability – evidence from Swedish industry. *Environmental Economics and Policy Studies* 12, 59-78.
- Gray, W., Shadbegian, R., 2003. Plant Vintage, Technology, and Environmental Regulation. *Journal of Environmental Economics and Management* 46, 384-402.
- Hamamoto, M., 2006. Environmental Regulation and the Productivity of Japanese Manufacturing Industries. *Resource and Energy Economics* 28, 299-312.
- Jaffe, A., Palmer, K., 1997. Environmental Regulation and Innovation: A Panel Data Study. *The Review of Economics and Statistics* 79, 610-619.
- Kitzmueller, M., Shimashack, J., 2012. Economic Perspectives on Corporate Social Responsibility. *Journal of Economic Literature* 50:1, 51-84.
- Lundgren, T., 2011. A Microeconomic Model of Corporate Social Responsibility. *Metroeconomica* 62:1, 69-95.
- McWilliams, A., Siegel, D., 2000. Corporate social responsibility and financial performance: correlation or misspecification? *Strategic Management Journal* 21:5, 603-609.
- Naucér, T., Tyreman, M., Roxburgh, C., 2012. Growth and renewal in the Swedish economy: Development, current situation and priorities for the future. McKinsey Sweden, McKinsey Global Institute.
- Paul, C. och D. Siegel, 2006. Special issue on corporate social responsibility and economic performance”. *Journal of Productivity Analysis* 26(3), 207–87.
- Porter, M., van der Linde, C., 1995. Toward a New Conception of the Environment Competitiveness Relationship. *Journal of Economic Perspectives* 9:4, 97-118.
- Reinhardt, F., Stavins, R., Vietor, R., 2008. Corporate Social Responsibility Through an Economic Lens. *Review of Environmental Economics and Policy* 2:2, 219-239.
- Swedish Energy Agency, 2013. Energy in Sweden 2013. The Swedish Energy Agency. Available at: http://www.iea.org/textbase/nppdf/free/2013/sweden2013_excerpt.pdf